



## Recognizing Potentially Explosive Chemicals and Peroxidizable Compounds

Many of the chemicals used routinely in laboratory applications, as well as in general maintenance operations, present substantial explosion hazards. The intent of the information provided below is not to create unnecessary panic or concern, but rather to raise general awareness surrounding the explosive nature of these products and to provide suggestions regarding safe handling and storage.

### Solvent Stabilization and Peroxidizable Compounds

Solvents, like other chemicals will degrade over time. Solvent deterioration is dependent on several factors—elapsed time since purification, shipping and storage conditions, individual solvent properties and the presence or absence of stabilizers. In some solvents, a byproduct of this degradation includes explosive peroxides, which may explode if subjected to thermal or mechanical shock. Since sunlight and oxygen promote peroxide formation, these conditions should be avoided during storage.

Please review the selection of chemical substances listed below. The list includes chemicals, which can deteriorate to a dangerous form with age, under common storage conditions. The degree of the hazard will vary considerably with age and the exact situation, but it is advisable to take precautions when discarding, recycling or otherwise handling old samples. **(This list is not necessarily comprehensive)**

Acetal (3) Acetaldehyde diethyl acetal (3) 2-Acetyl furan (3) Acetyl peroxide (1) Aluminium chloride (5)  
Aluminium lithium hydride (5) Ammonia solution (5) Ammonium hydroxide (5) Ammonium persulphate (5)  
Anethole (3) Anisaldehyde (3) Anisole (3) Anisyl chloride (5) Aqua regia (5)

Benzenesulphonyl chloride (5) Benzoyl peroxide (1) Bleach (5) Bleaching powder (5)  
2-(2-Butoxyethoxy)ethyl acetate (3) 2-Butoxyethyl acetate (3) t-Butyl hydroperoxide (4) iso-Butyl ether (2)  
n-Butyl ether (3) n-Butyl glycidyl ether (3)

Calcium carbide (5) Calcium hydride (5) Calcium hypochlorite (5) Cellosolve (3) Chloroform (5) Chromic acid (5)  
Chromium trioxide (4) Cleaning mixtures (5) Cumene (3) Cumene hydroperoxide (5) Cyclohexene (3)  
Cyclopentadiene (3) Cyclopentene (3)

Decahydronaphthalene (3) Decalin (3) Di-allyl ether (3) Di-iso-amyl ether (3) Dibenzyl ether (3)  
Di-iso-butyl ether (2) Di-n-butyl ether (3) Dicyclopentadiene (3) 1,1-Diethoxyethane (3)  
Diethylacetal (3) Diethyl azidoformate (4) Diethyl azodicarboxylate (1) Diethylene glycol dimethyl ether (3)  
Diethyl ether (3) Diglyme (3) Dihydropyran (3) 1,2-Dimethoxyethane (3) Dimethoxymethane (3)  
Dimethylamine (5) 2,4-Dinitrophenol (1) 2,4-Dinitrophenylhydrazine (1) 1,4-Dioxan (3) Diphenyl ether (3)  
Di-iso-propyl ether (2) Di-n-propyl ether (3)

Ether (3) Ethyl cellosolve (3) Ethylene glycol dimethyl ether (3) Ethylene glycol ethyl ether acetate (3)  
Ethylene glycol monobutyl ether (3) Ethylene glycol monoethyl ether (3) Ethylene glycol monomethyl ether (3)  
Ethyl ether (3) 2-Ethoxyethanol (3) 2-Ethoxyethyl acetate (3) Ethyl vinyl ether (2)

Formic acid (5) Furan (3)

Glycidyl n-butyl ether (3) Glyme (3)

Hydrogen peroxide (5)

Iodine pentoxide (4) Isoamyl ether (3) Isobutyl ether (2) Isopentyl ether (3) Isopropyl alcohol (3) Isopropyl ether (2)  
Isopropyl benzene (3)

Lauroyl peroxide (5) Lithium aluminium hydride (5) Lithium hydride (5)

Magnesium perchlorate (4) Mercury fulminate (1) 2-Methoxyethanol (3) Methylal (3) Methyl cellosolve (3)  
Methyl iso-butyl ketone (3) Methyl ethyl ketone peroxide (1) Methyl vinyl ketone (3)

Nitric acid (5) Nitromethane (1) Nitrosoguanidine (5)

Peracetic acid (1,4,5) Perchloric acid (4) Phosphorus trichloride (5) Picric acid (1) Picryl chloride (1)  
Picryl sulphuric acid (1) Potassium (metal) (1) Potassium amide (1) Potassium chlorate (4)  
Potassium persulphate (5) Propan-2-ol (3) Propargyl bromide (1) Propargyl chloride (1)

Silicon tetrachloride (5) Silvering solution (1) Sodamide (1) Sodium amide (1) Sodium borohydride (5)  
Sodium chlorate (4) Sodium chlorite (4) Sodium dithionite (5) Sodium hydride (5) Sodium hydrosulphite (5)  
Sodium hypochlorite (5) Sodium metal dispersions (1) Sodium perchlorate (4) Sodium peroxide (5)  
Sodium persulphate (5) Styrene (3)

Tetrahydrofuran (3) Tetralin (3) Thionyl chloride (5) Trinitrobenzene (1) Trinitrobenzene sulphonic acid (1)

Urea nitrate (4) Urea peroxide (5)

Vinyl acetate (3) Vinylidene chloride (1) Vinyl pyridine (3)

Zinc (5)

**(1) Can deteriorate to a shock-sensitive explosive.** Take exceptional care if there is evidence of drying out, crystallization or contamination. It may be very dangerous to attempt to open the container.

**(2) Forms peroxides, especially on exposure to air and light, making the material liable to explode.**

This class is so dangerous that it should not normally be distilled unless it has been very well controlled. Material more than one year old should be discarded, even if unopened. Containers should not be opened if there is any solid visible around the closure or any evidence of crystals inside.

**(3) Also forms peroxides.** If very old or obviously in poor condition treat as (2). Otherwise take care to test for peroxides before use or recovery procedures.

**(4) High energy materials which are sensitive to the presence of dust.** Clean the outside of containers before opening. If in doubt, do not open. Mixtures of the material with dust, paper or organics may ignite or detonate when exposed to friction, e.g on the threads of a screw-capped container.

**(5) Containers may have a high internal gas pressure, owing to decomposition.** Open carefully behind a safety shield in a fume cupboard. (N.B. A high internal pressure can also result from biological decay, radioactive decay or corrosion of metal containers.)



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